# The Shuttle Radar Topography Mission

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The Shuttle Radar Topography Mission (SRTM), is a cooperative project between NASA and the National Imagery and Mapping Agency of the U.S. Department of Defense. The mission is designed to use a single-pass radar interferometer to produce a digital elevation model of the Earth's land surface between about 60 degrees north and south latitude. The DEM will have 30 m horizontal resolution and about 15 m vertical errors. A rectified C-band image mosaic is also planned. The SRTM flight is currently manifested for September 1999; data processing will take approximately 1 year.

SRTM will modify the radar instrument that comprised the Spaceborne Imaging Radar-C/X-band Synthetic Aperture Radar (SIR-C/X-SAR) that flew twice on the Shuttle Endeavour in 1994. SIR-C/X-SAR was a cooperative project between NASA and the German and Italian Space Agencies and obtained data for over 50 science investigations. To collect the interferometric data, a 60 m mast, additional C-band antenna, and improved tracking and navigation devices will be added. A second X-band antenna will also be added by the German Space Agency, which will produce higher resolution topographic measurements in strips nested within the full, C-band coverage.

An extensive program for calibration and verification of the SRTM data will be undertaken. The calibration of the interferometer will allow fully automatic processing of the data to calibrated DEMs. Hardware calibration will consist of measurements of the mast length and orientation using electronic distance measurement units and a target tracker focused on a set of LEDs attached to the outboard antenna structure. The shuttle position and attitude will be monitored with a GPS receiver and star tracker. Radar path delays will be monitored by a phase-locked optically coupled calibration tone injected at the input to the receiver chains. These systems provide accurate relative calibration over short (less than the orbit period) time scales. Absolute calibration will be carried out through measurements at two ground control sites as well as of the ocean surface before and after every coast crossing, along with a few long deep-ocean passes.

Verification of the interferometric data and the DEMs will be accomplished through the use of 3 major test sites containing high-resolution DEMs and ground control points, some of which will be recognizable in the image data. In addition, we will have a globally distributed set of small, high-resolution DEMs, ground control points, and kinematic GPS surveys in order to evaluate long period errors in the final DEM mosaics.

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